

A Planning and Control Toolkit for Dual Arm Manipulation, Phase I

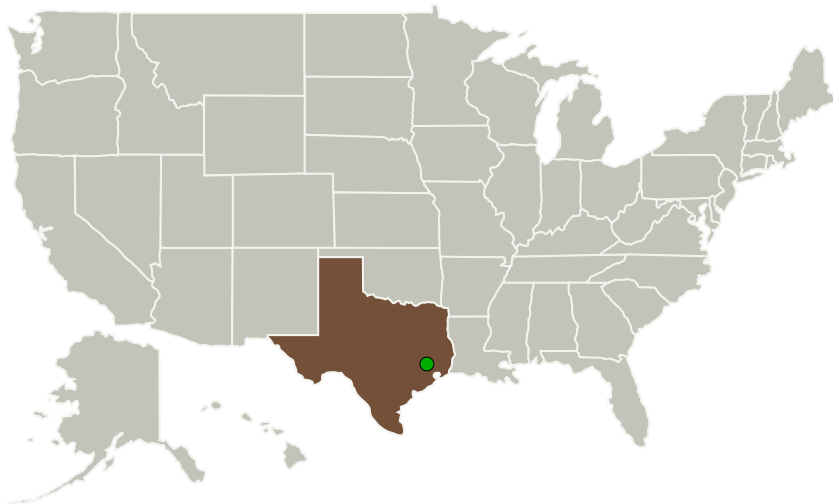
Completed Technology Project (2012 - 2012)



Project Introduction

It is often difficult to create autonomous robotic capabilities that match what can be achieved via teleoperation. Even though it is mechanically possible for a humanoid robot such as Robonaut 2 to perform complex coordinated tasks such as tying a knot, exchanging objects between end effectors, plugging in connectors, unscrewing a cap, opening a door, or grasping large objects with two hands, our lack of planning algorithms makes it difficult to control these behaviors autonomously. The lack of planning and control algorithms also impedes human-robot interaction as it is difficult for manipulation robots to plan arm trajectories in real-time using active sensing to avoid collisions with humans. This proposal is to develop a suite of planning and control algorithms that will enable NASA robots to perform complex manipulation behaviors in a coordinated way. This work would benefit NASA by making NASA robots more capable and useful during autonomous tasks and by enabling NASA robots to operate alongside humans during tasks that are shared between humans and robots.

Primary U.S. Work Locations and Key Partners



A Planning and Control Toolkit
for Dual Arm Manipulation,
Phase I

Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	3
Target Destinations	3

A Planning and Control Toolkit for Dual Arm Manipulation, Phase I



Completed Technology Project (2012 - 2012)

Organizations Performing Work	Role	Type	Location
TRAC Labs, Inc.	Lead Organization	Industry	Webster, Texas
● Johnson Space Center (JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations

Texas

Project Transitions

**February 2012:** Project Start**August 2012:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140334>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

TRAC Labs, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

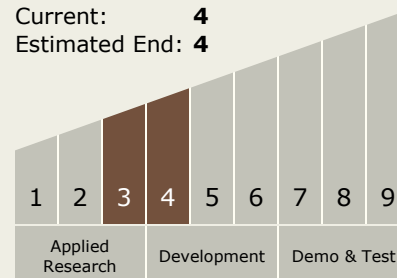
Program Manager:

Carlos Torrez

Principal Investigator:

Robert R Burridge

Technology Maturity (TRL)

Start: **3**Current: **4**Estimated End: **4**

A Planning and Control Toolkit for Dual Arm Manipulation, Phase I

Completed Technology Project (2012 - 2012)



Technology Areas

Primary:

- TX04 Robotic Systems
 - └ TX04.3 Manipulation
 - └ TX04.3.2 Grappling Technologies

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System